

WHAT IS CLAIMED IS:

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1. A hot-wire type air flow meter for an internal combustion engine, comprising:

an exothermic resistor film provided on a thin portion formed on a silicon substrate; and

a control circuit for controlling a voltage to be applied to said resistor film or a current to be supplied,

wherein said resistor film is arranged in a suction pipe of the internal combustion engine and emits heat to an air through said resistor film, and

in the case where a liquid droplet is deposited onto said resistor film, said control circuit controls said applied voltage to a value smaller than a voltage which is applied to said resistor film at the time of measuring a maximum specified measuring range or controls said supply current to a value smaller than a current flowing in said resistor film at the time of measuring the maximum specified measuring range.

2. A meter according to claim 1, further comprising another exothermic resistor provided on said silicon substrate in a portion other than said thin portion.

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3. A hot-wire type air flow meter for an internal combustion engine, comprising:

a first resistor film which is provided on a thin portion formed on a silicon substrate and generates heat and a second resistor film whose

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a control circuit which has a bridge circuit including said second resistor film and controls a voltage to be applied to said first resistor film or a current to be supplied,

wherein said first resistor film is arranged in a suction pipe of the internal combustion engine and emits heat to a measuring fluid through said first resistor film, and

in the case where an output of said bridge circuit is larger than a certain value, said control circuit controls said applied voltage to a value smaller than a voltage which is applied to said first resistor film at the time of measuring a maximum specified measuring range or controls said supply current to a value smaller than a current flowing in said first resistor film at the time of measuring the maximum specified measuring range.

4. A meter according to claim 3, further comprising another exothermic resistor provided on said silicon substrate in a portion other than said thin portion.

5. A hot-wire type air flow meter for an internal combustion engine, comprising:

an exothermic resistor arranged in a measuring fluid;

a control circuit for controlling a voltage

to be applied to said resistor or a current to be supplied;

first limiting means for limiting said applied voltage or said supply current to a value which is equal to or less than a first value; and

second limiting means for limiting said applied voltage or said supply current to a value which is equal to or less than a second value smaller than said first value,

wherein heat is emitted to said measuring fluid through said resistor, and

in the case where a liquid droplet is deposited onto said resistor, said applied voltage or said supply current is limited to a value which is equal to or less than said second value.

6. A meter according to claim 5, further comprising changing means for changing a predetermined value or said second value on the basis of a temperature of the liquid droplet or a measuring fluid.

7. A meter according to claim 5, further comprising changing means for changing said predetermined value or said second value on the basis of an output of a resistor which is arranged in said measuring fluid and whose resistance value changes in accordance with an ambient temperature.

8. A meter according to claim 7, wherein said changing means changes the value so as to reduce said predetermined value or said second value when said

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resistance value increases or changes the value so as to increase said predetermined value or said second value when said resistance value decreases.

9. A meter according to claim 5, wherein said exothermic resistor is a thin film resistor provided on a thin portion formed on a silicon substrate and arranged in a suction pipe of the internal combustion engine.

10. A meter according to claim 9, further comprising another exothermic resistor provided on said silicon substrate in a portion other than said thin portion.

11. A meter according to claim 10, wherein a heat generation of said another exothermic resistor is controlled independent of said exothermic resistor.

12. A hot-wire type air flow meter for an internal combustion engine, comprising:

an exothermic resistor arranged in a measuring fluid; and

a control circuit for controlling a voltage to be applied to said resistor or a current to be supplied,

wherein heat is emitted to said measuring fluid through said resistor, and

in the case where a liquid droplet is deposited onto said resistor, said control circuit controls said applied voltage or said supply current so that a generation heat amount per unit area of said

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resistor is smaller than an amount of heat by which a burn-out occurs at an interface between said resistor and said liquid droplet.

13. A hot-wire type air flow meter for an internal combustion engine, comprising:

an exothermic resistor arranged in a measuring fluid; and

a control circuit for controlling a voltage to be applied to said resistor or a current to be supplied,

wherein heat is emitted to said measuring fluid through said resistor, and

in the case where a liquid droplet is deposited onto said resistor, said control circuit controls said applied voltage or said supply current so that a generation heat amount per unit area of said resistor is smaller than a predetermined value.

14. A meter according to claim 13, wherein said predetermined value is equal to  $4 \times 10^5 \text{ W/m}^2$ .

15. A meter according to claim 13, further comprising changing means for changing said predetermined value or said second value on the basis of a temperature of the liquid droplet or said measuring fluid.

16. A meter according to claim 13, further comprising changing means for changing said predetermined value or said second value on the basis of an output of a resistor which is arranged in said

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measuring fluid and whose resistance value changes in accordance with an ambient temperature.

17. A meter according to claim 16, wherein said changing means changes the value so as to reduce said predetermined value or said second value when said resistance value increases or changes the value so as to increase said predetermined value or said second value when said resistance value decreases.

18. A hot-wire type air flow meter for an internal combustion engine, comprising:

a first resistor which is arranged in a measuring fluid and generates heat and a second resistor whose resistance value changes in accordance with an ambient temperature;

a control circuit which has a bridge circuit including said second resistor and controls a voltage to be applied to said first resistor or a current to be supplied;

first limiting means for limiting said applied voltage or said supply current to a value which is equal to or less than a first value; and

second limiting means for limiting said applied voltage or said supply current to a value which is equal to or less than a second value smaller than said first value,

wherein the heat is emitted to said measuring fluid through said first resistor, and

in the case where an output of said bridge

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circuit is ~~larger~~ than a certain value, said control circuit limits said applied voltage or said supply current to a value which is equal to or less than said second value.

19. A meter according to claim 18, further comprising changing means for changing a predetermined value or said second value on the basis of a temperature of a liquid droplet or said measuring fluid.

20. A meter according to claim 18, further comprising changing means for changing a predetermined value or said second value on the basis of an output of a resistor which is arranged in said measuring fluid and whose resistance value changes in accordance with the ambient temperature.

21. A meter according to claim 20, wherein said changing means changes the value so as to reduce said predetermined value or said second value when said resistance value increases or changes the value so as to increase said predetermined value or said second value when said resistance value decreases.

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22. A hot-wire type air flow meter for an internal combustion engine, comprising:

a first resistor which is arranged in a measuring fluid and generates heat and a second resistor whose resistance value changes in accordance with an ambient temperature; and

a control circuit which has a bridge circuit

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including said second resistor and controls a voltage to be applied to said first resistor or a current to be supplied,

wherein the heat is emitted to said measuring fluid through said first resistor, and

in the case where an output of said bridge circuit is larger than a certain value, said control circuit controls said applied voltage or said supply current to a value which is smaller than a heat amount by which a burn-out occurs at an interface between said first resistor and a liquid droplet.

23. A hot-wire type air flow meter for an internal combustion engine, comprising:

a first resistor which is arranged in a measuring fluid and generates heat and a second resistor whose resistance value changes in accordance with an ambient temperature; and

a control circuit which has a bridge circuit including said second resistor and controls a voltage to be applied to an exothermic resistor or a current to be supplied,

wherein the heat is emitted to said measuring fluid through said exothermic resistor, and

in the case where an output of said bridge circuit is larger than a certain value, said control circuit controls said applied voltage or said supply current so that a generation heat amount per unit area of said first resistor is smaller than a predetermined

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23. value.

24. A meter according to claim 23, wherein said predetermined value is equal to  $4 \times 10^5 \text{ W/m}^2$ .

25. A meter according to claim 23, further comprising changing means for changing said predetermined value or said second value on the basis of a temperature of a liquid droplet or said measuring fluid.

26. A meter according to claim 23, further comprising changing means for changing said predetermined value or said second value on the basis of an output of a resistor which is arranged in said measuring fluid and whose resistance value changes in accordance with the ambient temperature.

27. A meter according to claim 26, wherein said changing means changes the value so as to reduce said predetermined value or said second value when said resistance value increases or changes the value so as to increase said predetermined value or said second value when said resistance value decreases.

28. A meter according to claim 25, wherein said changing means changes the value so as to reduce said predetermined value or said second value when said temperature increases and changes the value so as to increase said predetermined value or said second value when said temperature decreases.

29. A hot-wire type air flow meter for an internal combustion engine, comprising:

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an exothermic resistor arranged in a suction pipe of said internal combustion engine;

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a control circuit for controlling a voltage to be applied to said resistor or a current to be supplied; and

transmitting means for transmitting a specific signal to a control unit of said internal combustion engine in the case where a liquid droplet is deposited onto said resistor,

wherein heat is emitted to an air through said resistor.

30. A meter according to claim 29, wherein said transmitting means transmits a signal including information regarding an amount of said deposited liquid droplet to the control unit of said internal combustion engine.

31. A meter according to claim 29, wherein said exothermic resistor is a thin film resistor provided on a thin portion formed on a silicon substrate and arranged in said suction pipe of said internal combustion engine.

32. A meter according to claim 29, further comprising another exothermic resistor provided on a silicon substrate in a portion other than said thin portion.

33. A meter according to claim 32, wherein a heat generation of said another exothermic resistor is controlled independent of said exothermic resistor.

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